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A NEW SPECIES OF HORNSCHUCHIA (ANNONACEAE) FROM ATLANTIC BRAZIL, WITH COMMENTS ON THE CIRCUMSCRIPTION OF THE GENUS TRIGYNAEA

David M. Johnson
Department of Botany-Microbiology
Ohio Wesleyan University
Delaware, Ohio 43015

Renato de Mello-Silva
Herbário, Departamento de Botânica
Universidade de São Paulo
Caixa Postal 11461
05499 São Paulo, São Paulo, Brazil

Hornschuchia Nees is endemic to the Atlantic Coast forests of eastern Brazil. Its small flowers with only six stamens and 3–5 carpels are atypical in the Annonaceae. In fact, *Hornschuchia* was assigned to the Sapindaceae, Sapotaceae, Olacaceae, Ebenaceae, Lardizabalaceae, Menispermaceae, and Styracaceae before its affinity to Annonaceae was finally recognized (Fries 1931).

Previously the only fruit type known in *Hornschuchia* was an aggregate of 1–3 linear thin-walled monocarps with several terete seeds attached laterally and inclined obliquely to the long axis of the monocarp. Recent collecting in Brazil has yielded a plant with the long-conic flower buds and connate sepals typical of a *Hornschuchia*, but which has an ovoid thick-walled monocarp with trigonous seeds that are perpendicular to the long axis, a fruit and seed morphology more like those found in the related genus *Trigynaea* Schlechtendal. We provide a description of this distinctive species here, followed by a discussion of its proper generic placement.

Hornschuchia citriodora D. M. Johnson, sp. nov.—TYPE: BRAZIL. Espírito Santo: Guarapari, Rodovia do Sol, estrada que liga a BR-101 à Praia Setiba na ES-060 a 6 km da BR-101, 40°27'W, 20°33'S, 23 Feb 1988 (fl! fr!) *Pirani et al. 2435* (holotype: SPF-2 sheets!; isotypes: MBM! NY-2 sheets! OWU-2 sheets! RB! U!). Fig. 1.

Species floribus grandibus solitariis, pedicellis 8.5–11.5 mm longis ex internodiis dependentibus, carpellis numero 3–5 variantibus, monocarpiis ovoideis, et seminibus oblongo-ellipsoideis subangulatis intra monocarpium transverse dispositis congeneribus differt.

Treelet 5 m tall, DBH 5–6 cm. Leaf-bearing twigs 1–3 mm thick, dark brown to pale gray, glabrate. Lamina of larger leaves 13.5–18.6 cm long, 4.8–7.0 cm wide, chartaceous to subcoriaceous, elliptic to oblong-elliptic; base narrowly to broadly cuneate; apex short-acuminate, the tip 11–15 mm long; surface glabrous; midrib plane or slightly impressed adaxially, raised abaxially; secondary veins 8–10 per side, at 50–70° to midrib, slightly raised adaxially, more strongly so abaxially; higher-order veins slightly raised on both surfaces. Petiole 5–6 mm long, 1.5–2.1 mm

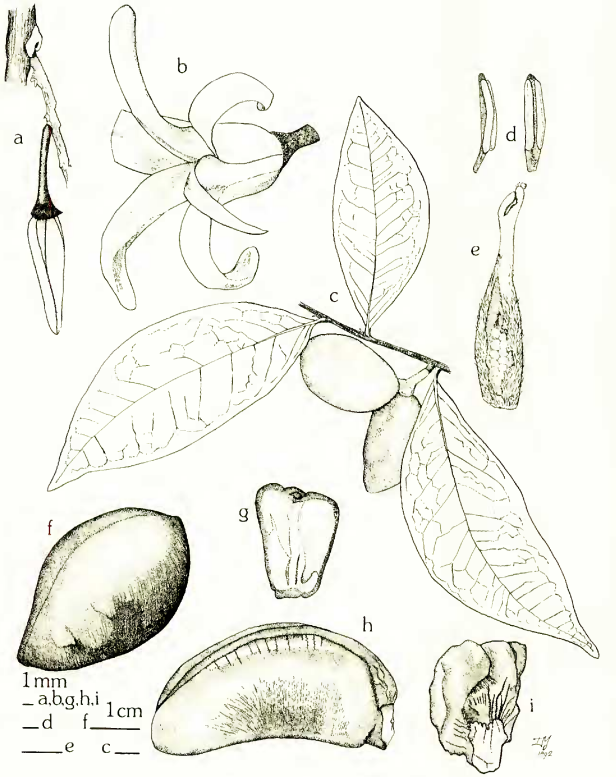

FIG. 1. *Hornschuchia citriodora*. a, flower bud; b, flower at anthesis; c, habit; d, stamens, lateral view on left and dorsal view on right; e, carpel with portion of ovary wall removed to show ovules; f, monocarp; g, seed in cross section, showing the platelike ruminations of the seed coat into the endosperm; h, seed, lateral view; i, seed, end view showing hilar region. (a, d, e based on *Pirani et al. 2435*; b, c, f–i based on *Johnson et al. 1848*.)

wide. Flowers solitary, the pedicel internodal or supra–axillary, or less commonly compound and axillary, 8.5–11.5 mm long, 0.5–1 mm thick at midpoint in flower. Buds long-conic, acute at apex. Calyx 3.1–3.5 mm in diameter, 1.5 mm deep, discoid, the lobes apiculate, sparsely pubescent along margins on both surfaces. Corolla white, petals revolute at anthesis. Outer petals 12–14.7 mm long (30 mm long in flower preserved in ethanol), 1.9–2.3 mm wide, lanceolate-ligulate, flat or with a slight keel adaxially, acute at apex, glabrous adaxially, pubescent along

midrib and margins abaxially; inner petals 11–12 mm long (35 mm long in flower preserved in ethanol), 2.5 mm wide, linear-lanceolate, increasingly concave adaxially from about midpoint to the base, puberulent in concavity, otherwise glabrous. Stamens 6, 4.5 mm long, oblong, connectives obtuse at the apex. Carpels 3–5; ovary 4 mm long, pubescent; ovules 9–12, in two rows on adaxial wall of ovary; stigmas ca. 1.0 mm long, globose to clavate. Torus in flower 1.5 mm in diameter, flat to slightly convex, hispid. Pedicel in fruit 10 mm long, 2.2 mm wide, longitudinally wrinkled; torus in fruit 4 mm in diameter; calyx persistent in fruit. Monocarps 4.3 cm long, 2.6–2.8 cm wide; ovoid, sessile, glabrous, shiny (in vivo); base rounded; apex bluntly conical; wall rugulose and 1 mm thick when dry. Seeds ca.8, at 90° to long axis of monocarp, 15–19 mm long, 8.5–9.5 mm wide, irregularly oblong–ellipsoid, subangulate in cross section, brown (tan in vivo); caruncle absent; hilum 3.5 mm long, 1.5 mm wide.

Additional Specimens Examined. **Brazil**. Bahia: Mpio. Alcobaça, Km 6–8 da Rod. BA 001, trecho Alcobaça/Caravelas, 16 Sep 1978 (fl), *Santos et al. 3328* (CEPEC).—Espírito Santo: along rd connecting BR-101 and ES-060 (marked as rd for Praia do Sol), 6 km from BR-101, 3 km from ES-060 [=type locality], 31 Jul 1991 (fl, fr), *Johnson et al. 1848* (CEPEC, NY, OWU).

Hornschuchia citriodora is distinctive within its genus by the combination of sharply pointed flower buds, 3–5 carpels per flower, and ovoid monocarps with transversely arranged trigonous seeds. In its flowers that are borne singly on the internodes of leafy branches it may be distinguished from *H. bryotrophe* Nees, *H. polyantha* P. Maas, *H. cauliflora* P. Maas & van Setten, and *H. obliqua* P. Maas & van Setten, all of which have multiple flowers borne either on the trunk or on specialized leafless inflorescence branches. The other species with solitary internodal flowers, *H. myrtillus* Nees and *H. alba* (St. Hilaire) R. E. Fries, both have much smaller leaves (maximum length 8 cm); in addition, the flower pedicels of *H. myrtillus* are 10–15 mm long and more slender, and in *H. alba* the calyx is pubescent and deeply cup-shaped (2 mm deep).

This species is known at present from only two localities, one in southern Bahia and the other in Espírito Santo, in wet forest near sea level. This distribution straddles an important phytogeographic line on the Brazilian coast. North of the Rio Doce the minimum temperature is never lower than 18°C and the higher rainfall (ca. 1300 mm annually, is evenly distributed throughout the year. South of the river the temperatures can be lower, the rainfall is more seasonal, and the total annual precipitation is lower as well (Soderstrom & Calderón 1974).

Only a single individual of this species was found at the Espírito Santo locality in a forest remnant with species such as *Esenbeckia grandiflora* Mart. (Rutaceae), an undescribed species of *Galipea* (Rutaceae), *Hornschuchia bryotrophe*, *Phyllostemonodaphne geminiflora* (Meissn.) Kosterm. (Moraceae), *Ravenia infelix* Vell. (Rutaceae), and *Sorocea hilarii* Gaud. (Moraceae), as well as species of *Aspidosperma* (Apocynaceae), *Bathysa* (Rubiaceae), *Bauhinia* (Caesalpiniaceae), *Cordia* (Boraginaceae), *Dichorisandra* (Commelinaceae), *Eschweilera* (Lecythidaceae), *Jacaratia* (Caricaceae), *Lygodium* (Schizaeaceae), *Mollinedia* (Monimiaceae), *Ouratea* (Ochnaceae), *Passiflora* (Passifloraceae), *Paullinia* (Sapindaceae), *Piper* (Piperaceae, two species), *Rinorea* (Violaceae), and *Senna* (Caesalpiniaceae). A flower at anthesis on a cut branch produced at dusk a strong fragrance of *Citrus* flowers, but no flower visitors were observed in the field.

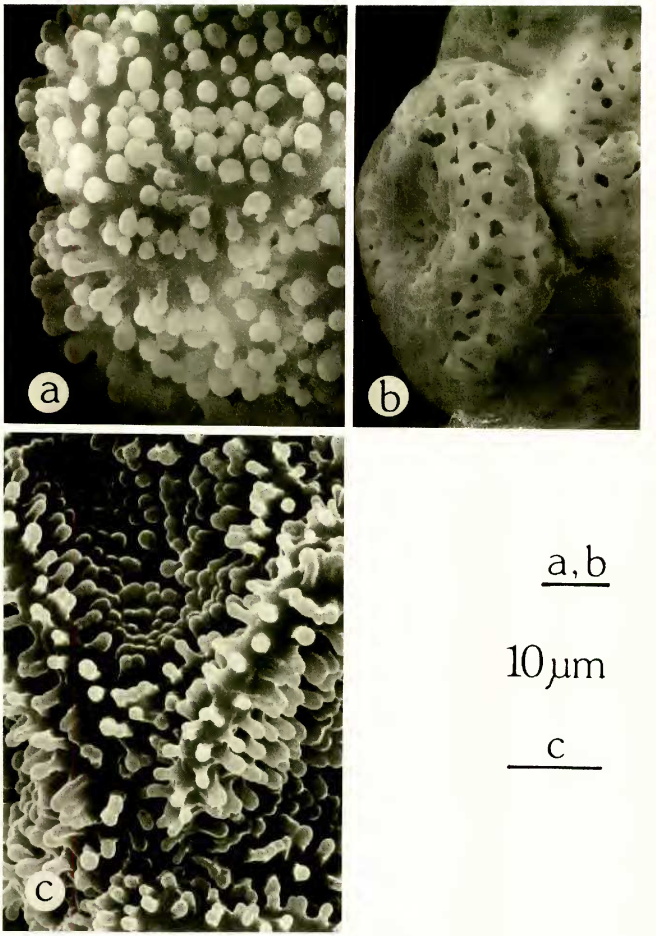

FIG. 2. SEM photographs of surface ornamentation of pollen grains. Only a portion of the entire octad is shown for each species. a, *Hornschuchia citriodora* (*Pirani et al. 2435*), with club-shaped columellae on the surfaces of three grains; b, *H. bryotrophe* (*Johnson et al. 1847*), showing the perforate tectum formed by fusion of the apices of hidden columellae on the surfaces of four grains; c, *Trigynaea* aff. *duckei* (R. E. Fries) R. E. Fries (*Foster 9212*), with rod-shaped columellae on the surfaces of four grains.

Fries (1959, recognized three genera within his "Trigynaea Gruppe" that have small flowers and apiculate anther connectives: *Trigynaea* Schlechtendal, *Bocagea* St. Hilaire, and *Hornschuchia*. He distinguished *Trigynaea* from *Hornschuchia* on the basis of its numerous (24 or more) versus only six stamens, plus the free sepals of the former versus the connate sepals of the latter. He also described *Trigynaea* as having rounded flower buds, 1–6 ovoid carpels, and a rounded or obovate monocarp, whereas *Hornschuchia* had elongate-cylindric flower buds, 3 linear-oblong carpels, and narrowly ellipsoid or spindle-shaped monocarps.

A further difference between the two genera was reported by Walker (1971), who found pollen with tectate-columellate exine in polyads of 16 grains in *Hornschuchia bryotrophe*, but intectate-columellate exine and polyads of 8 grains in the pollen of the three species of *Trigynaea* he sampled (Fig. 2). The intectate exine pattern is highly restricted within the Annonaceae, previously known elsewhere only in the African genus *Ophrypetalum* Diels (Walker 1972), which has pollen in tetragonal tetrads. *Hornschuchia citriodora* and several other species of *Hornschuchia* are now known to have intectate-columellate pollen in octads as well.

The generic boundaries between *Hornschuchia* and *Trigynaea* are therefore blurred. Like other species of *Hornschuchia*, *H. citriodora* has long-conic buds, connate sepals, linear-oblong carpels, and only six stamens. With *Trigynaea* it shares the characters of 3–5 carpels, ovoid monocarps, and trigonous seeds. Tectate versus intectate pollen no longer provides a generic distinction. Should *Hornschuchia* and *Trigynaea* be combined, the name *Hornschuchia*, the older of the two, will stand.

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RESUMO

É descrita e ilustrada uma nova espécie de Annonaceae, *Hornschuchia citriodora*, da flora costeira do leste sudeste do Brasil. A nova espécie conquanto possua características típicas de *Hornschuchia* como o formato dos botões florais, das sepalas, dos carpelos e número de estames, compartilha com o gênero afim, *Trigynaea*, caracteres como o pólen, o número de carpelos e o formato dos carpídios e sementes, tornando questionável a distinção destes gêneros.